1877MNRAS..38...32.

The line D3 has not, I think, been described before. It is a difficult line to see, and only to be made out with high powers. I have not reduced my measure to wave lengths, because the results obtained by Dr. Huggins and Colonel Campbell are only recorded in drawings, without measures. I have had prepared enlarged drawings of those obtained at Kew and London, with a careful plot from my own measures, which I enclose.

There are not many of the lines which agree; but as Dr. Huggins used bisulphide of carbon prisms, and Colonel Campbell only eight prisms, some of the differences might disappear if all could be reduced to wave lengths. On closely comparing the drawings, it will be seen that five lines were recorded in London between my No. 7 and D2, two others between D1 and No. 1, and three between Nos. 2 and 3. These spaces appear in Sydney, even under the most favourable conditions, entirely free from lines, or any sign of them. It would appear, therefore, that there must be some gases in the atmosphere of Europe, and especially of London, which are not present in Australia, or at least at Sydney.

Sydney Observatory,
July 26, 1877.

On the Spectrum of a Solar Spot observed at the Royal Observatory, Greenwich.

(*Communicated by the Astronomer Royal.*)

A fine spot has recently passed across the Sun's disk, showing a spectrum remarkable for the number of lines which are more or less affected by increased absorption, as will be seen from the following table:—

Element.	Number of lines observed.	Character of Change.
Calcium	12	Very much darker, and about doubled in breadth.
Sodium	2	Very much darker. The two D lines almost meet over the nucleus.
Titanium	11	Very much darker, and about doubled in breadth.
Iron	30	Slightly broader, by about a tenth, and decidedly darker, about half as dark again.
Barium	4	About twice as dark and twice as broad.
Magnesium	4	Much broader and darker.
Nickel	6	Half as broad again. Slightly darker.
Chromium	3	Somewhat darker, and broader by about one-tenth.
Hydrogen	3	Much fainter and less distinct. F line reversed in the neighbourhood of the spot, due north of the centre, on Nov. 5.
Coronal line	1	Much fainter over the spot.
D_3	1	Not seen either bright or dark, in spot or bridge.
Telluric bands	1	Band α. Broader and darker.

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1877MNRAS..38...32.

The following lines and bands were also broadened :—

Line.	Wave length.	Character of Change.
K 588	6927	Darkened.
B	6869	Darkened and slightly broadened on the red side by about one tenth-metre of wave length.
K 712	6517	Double usual breadth. This is probably one of the lines of Barium.
K 765 ±	6380 ±	An appearance as of a dark shaded band, sharp towards the blue, and shaded off towards the red. Nothing seen on the Sun to correspond with it.
K 1493	5297	A cluster of several lines, of which only those on the blue side are affected. Much darker, and wider on the blue side by 0·3 tenth-metre of wave length. Two of these probably belong to Titanium.

Lines from Kirchhoff's map are denoted by the letter K and the No. on his scale.

Besides the increase in the breadth, displacements to the red or blue were noted, especially in the case of the F and D lines. On October 31 the F line was twisted, the part over the following half of the spot being displaced to the red, and the other half towards the blue, by amounts corresponding respectively to a recession or downward motion of nine miles, and an approach or upward motion of three miles a second. On the darkest part of the spot the D lines were broadened on the red side to the extent of $\frac{1}{2}(D_1 - D_2)$, the more refrangible edge being sharp, and not sensibly displaced. This would indicate a large downward motion of perhaps thirty miles a second. On other parts of the spot the haze appeared to be chiefly on the blue side. The spot was first seen (after an interval of cloudy weather) on October 30, when it was well advanced on the disk, and photographs were obtained on October 30, 31, November 1, 2, 3, 4, 5, during which period it underwent but little change, except that a group of small spots closely following it had closed up by November 5, leaving merely a group of faculæ, which were seen near the limb on November 8. The large spot would appear to have passed off about November $7^d\,6^h$, but clouds prevented any observations between November 5 and 8. On November 8 there was no unusual disturbance of the chromosphere, the only indication of the position of the spot being a small jet 20″ high. With the exception of the group of faculæ the Sun appeared to be in a quiescent state.

The observations were made by Mr. Christie and Mr. Maunder, using the new "half-prism" spectroscope (direct-vision) with a train of two "half-prisms" reversed, so as to give great purity of spectrum.

Royal Observatory, Greenwich,
1877, *November* 9.

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